

A Drill-Integrated Gamma Ray/Neutron Detector for Solar System Exploration

Completed Technology Project (2018 - 2019)



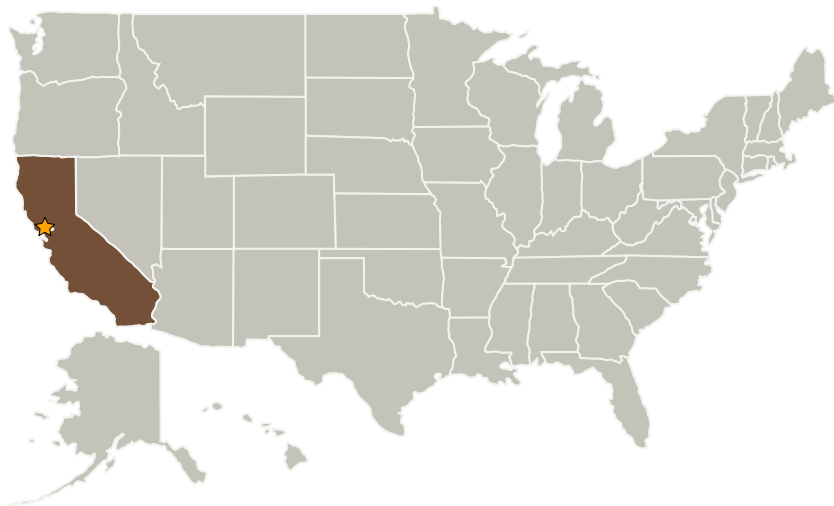
Project Introduction

The approach is to integrate neutron/gamma instrumentation into a unique sample-acquisition drill, developed by Honeybee Robotics under an SBIR, and greatly matured under the HEOMD/Advanced Exploration Systems for the Resource Prospector mission, led by ARC. This approach includes (1) adapting an existing brassboard design for gamma/neutron detector into the required volume; (2) procuring the required scintillator (CLYC) and photodetectors (small silicon photo multipliers) plus pre-amps for assembly; and (3) integrating and testing the system in a relevant environment (EEL time included in budget).

Anticipated Benefits

NASA needs tools to assess subsurface environments on the Moon, Mars, Phobos/Deimos or an asteroid to understand the composition and identifying potentially habitable environments, or for resource characterization and ISRU. Such drill-integrated instrumentation does not currently exist for planetary surface applications. A key needed capability is to measure while drilling, and to immediately recover a subsurface sample based on those measurements in a single operation. This simplifies the process of sample acquisition, and reduces overall operational risk.

Primary U.S. Work Locations and Key Partners



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| Organizations Performing Work | Role | Type | Location |
|--|-------------------------|-------------|--|
| ★ Ames Research Center(ARC) | Lead Organization | NASA Center | Moffett Field, California |
| Honeybee Robotics, Ltd. | Supporting Organization | Industry | Pasadena, California |
| Millennium Engineering and Integration Company | Supporting Organization | Industry | Arlington, Virginia |
| University of Cape Town | Supporting Organization | Academia | Cape Town, Outside the United States, South Africa |

Primary U.S. Work Locations

California

Project Website:

https://www.nasa.gov/directorates/spacetech/innovation_fund/index.html#.VQ

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Center Innovation Fund: ARC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

Harry Partridge

Principal Investigator:

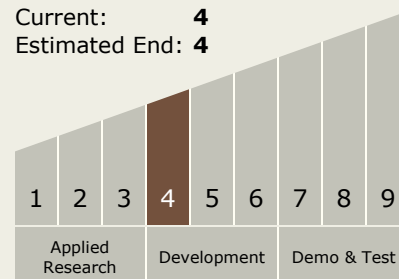
Richard C Elphic

Technology Maturity (TRL)

Start: 4

Current: 4

Estimated End: 4



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Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.1 In-Situ Resource Utilization
 - └ TX07.1.1 Destination Reconnaissance and Resource Assessment

Target Destinations

The Moon, Mars, Others Inside the Solar System